The Relationship between Intelligence and Religiosity: A Critical Review of the Literature

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Abstract

The overwhelming majority of Americans claim that religion is an important part of their lives, and the influence of a person's religiosity spills over into multiple aspects of life, from opinions on public policy to choice of marriage partner to importance placed on education. For over 80 years, psychologists have examined how religiosity is related to intelligence in wildly varying ways and with a very diverse range of findings. This article reviews and synthesizes this literature and suggests what must occur in the future to be able to come to reasonable conclusions about this relationship and potential mediators that are key to it.

Keywords: intelligence, religiosity, fundamentalism, atheism

Religion plays an important role in the lives of most Americans today. A recent poll found that 83% of Americans claim that religion is at least a fairly important part of their lives and that 82% of Americans considered themselves to be Christians (Gallup, Inc., 2007). While these numbers have declined slightly over the past thirty years, religion is still a driving force in people's daily lives. Religious beliefs have also been found to significantly affect people's opinions concerning education, scientific research, and numerous other areas (for a review, see Lehrer, 2004). One public opinion survey of over 2,000 people showed that 60% of white evangelical Christians believe that if the Bible and the will of the American people conflict, the Bible should have a larger influence on U.S. laws (Pew Research Center for the People & the Press, & Pew Forum on Religion & Public Life, 2006). Within the United States, this preference has been particularly evident with the rise of Christian fundamentalism and its political influence over the past 85 years. This has included impacting laws concerning the teaching of evolution, stem cell research, and abortion rights. The word "fundamentalist" made its first print appearance in 1920 in reference to traditional Christian beliefs that opposed liberal Protestants' acceptance of modern and secular ideas, especially teaching evolution in public schools (Davis, 2005).

Beginning in the 1920s, a fairly large body of literature has examined how religiosity affects an aspect of life often deemed of primary importance in society and the subject of intense psychological research: intelligence. Unsurprisingly, studies on the topic often generate attention-grabbing headlines, such as "Religious people branded as less intelligent than atheists in provocative new study" (Cooper-White, 2013) and "Atheists 'have higher IQs': Their intelligence 'makes them more likely to dismiss religion as irrational and unscientific'" (Bates, 2013), and are the subject of intense debate.

The review that follows will examine the diverse research concerning religious beliefs as they relate to various measures or proxies of intelligence. Following this review of the literature will be a summary and critique of the existing literature and recommendations for moving the literature forward in a productive manner.

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Religious Beliefs and Measures of Intelligence

Level of intelligence is a variable that has been studied extensively in connection with religion. However, much of the literature examining the two is either incredibly old or methodologically questionable. This section begins with studies correlating various measures of IQ with religious measures. Next, studies that evaluate college entrance exam scores rather than a direct measure of intelligence will be addressed. Afterwards, research using measures that are purportedly indicative of an intellectual orientation are reviewed. Finally, the past decade of research on the relationship between intelligence and religion will be reviewed specifically.

Direct Intelligence Measurement & Religiosity

Interestingly, although there is a large body of research often lumped together as having examined the link between religious beliefs and intelligence, relatively few studies have directly assessed this by measuring IQ. One early study (Franzblau, 1934) used the Terman Group Test of Mental Ability to find the IQs of 378 Jewish adolescents enrolled in religious schools. Terman's Mental Ability test initially yielded a "mental age" score, which was used to calculate an IQ score. The Religious Ideas Test, which was created for this study as a means of measuring the children's tendency to accept traditional religious beliefs, was also administered. Higher scores indicated greater acceptance of traditional religious beliefs. Analyses showed that participants' Religious Ideas Test scores had a correlation of -.349 with "mental age" and a correlation of -.147 with IQ. The religious measures also correlated negatively with the adolescents' chronological age and with grade and acceleration in school. Franzblau (1934) concluded that "lower scores on the Religious Ideas Test tend to be associated with higher intelligence, greater grade progress, and greater maturity" (p. 39).

In a more recent study of the relationship between intelligence and religiosity in adolescents, Francis (1998) evaluated a group of 711 fifteen- and sixteen-year-old British students. The religious measure was the internally reliable Francis Scale of Attitude toward Christianity, which contains Likert scale items asking the students how they feel about God, Jesus, the Bible, prayer, and church. Raven's Standard Progressive Matrices was the measure of intelligence used in this study; it should be noted, however, that this test is only a measure of nonverbal cognitive ability. The only significant relationship found in this study was that between attitude toward Christianity and participant sex. Female participants reported a much more favorable attitude toward Christianity than did male participants, as is typically found in research on religion (Stark, 2003). There was no significant relationship found between intelligence and attitude toward Christianity in this group of British adolescents.

Foy (1976) hypothesized that more intelligent participants would be less likely to subscribe to church dogma (that is, that the set of principles laid down by the church are incontrovertibly true). To test this hypothesis, the Wechsler Adult Intelligence Scale (WAIS) was administered to 36 Caucasian adults living in Mississippi. Based on their IQ scores, participants were placed in Low (less than 111), Middle (111-124), or High (greater than 124) intelligence groups. The Religious Attitude Inventory was also administered, with higher overall scores indicating greater religious orthodoxy. The inventory consisted of two subscales measuring "general religiosity" and "church attitude," the multi-dimensionality of which Foy (1976) believed to be important in measuring religiosity. Results showed that intelligence groups differed significantly in their "church attitude" scores, with those in the High intelligence group scoring lower than those in the Middle and Low intelligence groups. Participants in the High intelligence group also scored significantly lower on "general religiosity" than those in the Middle or Low groups. Overall Religious Attitude Inventory scores showed a correlation of -.498 ($p < .01$) with participants' full scale IQ. Results of this study demonstrate that adults with IQs greater than 125 are significantly less likely than those with lower IQs to hold orthodox religious beliefs, to dogmatically follow traditional church teachings, or to have high levels of religiosity.

Clark (2004) also evaluated intelligence and its relationship with religion in a multidimensional manner, differentiating between religiousness and spirituality. Participants were 77 undergraduates from the University of California, Davis. The Wechsler Adult Intelligence Scale-Third Edition (WAIS-III) was used to determine IQ. Self-reported SAT scores, which Clark (2004) found to be significantly correlated with IQ scores, were also included in analysis. Spirituality was measured using the Spiritual Transcendence Scale (STS), which assesses participants' feelings of connectedness with humanity, belief that all life is unified, and satisfaction attained from prayer. Religiousness was measured based on responses to how participants classified themselves religiously and to questions concerning religious background and behaviors, with lower scores indicating that religion played less of a role in their lives. Several significant relationships emerged between intelligence and religiosity. The frequency of participants' religious behaviors and their self-reported Quantitative SAT scores had a correlation of -.31 ($p < .05$).

The Prayer Fulfillment subscale of the STS was the most significantly related to intelligence, correlating significantly and negatively with Verbal IQ ($r = -.27$), Verbal SAT ($r = -.25$), and Quantitative SAT ($r = -.30$). Although it was a subscale of the STS, prayer fulfillment correlated at higher levels with religiosity than spirituality, indicating that it is better viewed as a feature of religiosity. The author concluded, based on the religiosity and spirituality measures, that religious and spiritual people perform the same sorts of religious or spiritual activities, but those who are religious perform them more often. This study indicates that people who perform religious activities frequently tend to have lower scores on intelligence measures than their less religiously active counterparts.

Intelligence Proxies & Religiosity

Several older studies have correlated religious measures with tests that were related to intelligence but did not directly assess it, such as college entrance exams. One of the earliest of these studies found a correlation of -.36 between religious conservatism and intelligence in college students, as determined by grades and tests of memory, problem-solving, and direction-following (Howells, 1929). A few years later, Carlson (1934) found similar results in 215 college seniors using Thurstone's Attitude toward God scales and scores from college entrance exams, concluding that "there is a tendency for the more intelligent undergraduate to be sympathetic toward… atheism" (p. 208).

Gilliland (1940) conducted a similar study using Thurstone's Attitude toward God scales and an unnamed intelligence measure. No significant correlation between intelligence and attitude toward God was found in the 326 college students surveyed. Aimed at supplementing Gilliland's (1940) work, Gragg (1942) ran a study using 100 students attending denominational colleges in the South. Gragg also used Thurstone's Attitude toward God scales as the religious measure and obtained scores from American Council on Education's (ACE) Psychological Examination for College Freshmen as the intelligence measure. A negative but statistically non-significant correlation was found between intelligence and attitude toward God.

Brown and Lowe (1951) evaluated students enrolled in either a state university or a Bible college to determine if there was a relationship between intelligence, as measured by the American Council on Education Psychological Examination (ACE) scores, and the students' acceptance of Christian dogma. The degree to which students accepted fundamentalist Christian dogma was assessed using the Inventory of Religious Belief. Students were labeled as Bible students, Believers, or Non-Believers. Results showed that students who reported a strong belief in and acceptance of Christian dogma scored significantly lower on the ACE than those who rejected it. In fact, Non-Believers (ACE score = 119) scored an average of 30 percentile points higher than did Believers or Bible students (ACE scores = 98 and 100, respectively). It should be noted that the ACE is more similar to modern ACT or SAT exams than modern intelligence measures, in that it was designed to assess scholastic aptitude rather than various aspects of intelligence.

Plant and Minium (1967) reported on a set of five different longitudinal studies correlating intelligence with religiosity measures. The Dogmatism scale, which assesses a person's openness to other belief systems and the Religious subscale of the Allport-Vernon-Lindzey (AVL) Study of Values were used as the religion measures. Depending on the college, intelligence scores were based on either the ACE college entrance exam or the School and College Ability Test (SCAT). Students who scored in the top 25% of participants at their school were placed in the high-aptitude subgroup, and those who scored in the bottom 25% were place in the low-aptitude subgroup. With the exception of a group of women in one study, those in the high-aptitude subgroups consistently scored lower on the Dogmatism scale and Religious subscale. In each group tested, re-administration two or four years later resulted in mean scores that were lower than initial test scores for both scales of interest, meaning that dogmatism and religiosity scores decreased during the respondent's time in college. Among male and female participants, three of the eight groups administered these scales showed a significantly greater decrease over time in the high- as opposed to low-aptitude groups. Not only did the high-aptitude groups score lower on the dogmatism and religious measures than the low-aptitude groups, their scores tended to decrease more dramatically over time as well.

Those who consider themselves to be religious can vary greatly in their beliefs and attitudes, making classification of people as either religious or non-religious difficult. In order to make more accurate classifications among religious and non-religious people, Poythress (1975) evaluated 201 college students using the Dogmatism scale and a Likert format of the LAM scales. The LAM scales, which have strong validity and reliability, were developed to classify respondents' beliefs as Literal (fundamentalist), Antiliteral (non-religious), or Mythological (interpreting religious word and doctrine as symbolic rather than literal). This was done to prevent religious respondents with non-fundamentalist beliefs from being misclassified as non-religious. Students' SAT scores were used as measures of intelligence. All religious respondents, including both the Literal and the Mythological, were combined to form the "believers" group and were compared to the religious "skeptics," revealing significant

differences. Skeptics had significantly higher Verbal SAT scores ($p < .01$), Quantitative SAT scores ($p < .05$), and Total SAT scores ($p < .01$) than believers. Skeptics also scored significantly lower on the Dogmatism scale ($p < .005$) than did believers. This study demonstrates that religious skeptics score higher on measures of intelligence and have a more open, less authoritarian belief system than believers.

      Religiosity studies that analyze groups of people who demonstrate above average intelligence or achievement in intellectual pursuits allow researchers to compare religious beliefs within this unique group with the religious beliefs of the average person. One study found that college seniors who greatly valued intellectualism were over three times more likely to have renounced their religious faith than those who did not place a high value on intellectualism (Caplovitz & Sherrow, 1977). The authors cited commitment to empirically based truths and alienation from conventional values as likely causes for intellectualism's undermining effect on religion in intellectuals.

      Warren and Heist (1960) evaluated the personality traits of 918 gifted college students who had been chosen as National Merit Scholar finalists. It should be noted that National Merit Scholars are nominated based on "rank in class, motivation, breadth of interests, accomplishments, personality, and leadership potential" (p. 331), not simply intelligence. Participants' SAT scores were converted, using a questionable conversion method involving several translations, to Stanford-Binet IQs; the lowest score converted to 130 and the average to 150 (which would be over three standard deviations from the mean). The Religious scale, a measure of how much meaning a person sees in life, of the AVL Study of Values was used as the religion variable. The researchers found that the National Merit Scholarship students scored no differently on this particular religious measure than other college students.

      Southern and Plant (1968) surveyed 72 members of Mensa, also using the Study of Values. In order to become a member of Mensa, one must have taken a standardized intelligence test and obtained a score higher than 98% of the population. Mensa members showed a significantly ($p < .01$) lower Religious score than those in the norm groups. Interestingly though, Southern and Plant (1968) also compared the results of the Mensa members' Religious scores to those of the National Merit Scholars in the Warren and Heist (1960) study and found no significant differences between the two groups.

      Wiebe and Fleck (1980) administered scales to 158 Canadian college freshmen in order to examine their personalities in relation to their religious orientation. Participants were categorized as either religiously extrinsic (viewing religion as somewhat of a means to an end) or intrinsic (seeing religion as the main purpose of life) based on the Religiosity scale. Based on answers to demographic questions, respondents were further grouped as Catholic intrinsic or extrinsic, Protestant intrinsic or extrinsic, or non-religious. The Sixteen Personality Factor Questionnaire (16PF) was also administered as a proxy measure of intellectual ability. Higher scores on the Reasoning subscale of the 16PF imply a preference for abstract thinking and possibly greater mental capacity. Extrinsically religious participants shared significantly more personality traits with the non-religious participants than they did with the intrinsically religious participants. Three significant interactions appeared between religion and Reasoning. Intrinsic Catholics tended to have low Reasoning scores, while extrinsic Protestants had moderate Reasoning scores. Non-religious participants demonstrated the highest Reasoning scores.

      Copeland (1995) evaluated the relationship between intellectual development (as measured by the Scale of Intellectual Development [SID]) and levels of Protestant fundamentalism (as measured by the Copeland Fundamentalism Scale [CFS]). Based on his research of the literature, Copeland defined Protestant fundamentalism as adherence to the ideas that the Christian Bible alone is a literal, inerrant authority, that Christ was born from a virgin mother, sacrificed himself to pay for humankind's sins and was resurrected, and that the Christian message must be shared with others. The concept of intellectual development is placed on a continuum, where dualism is the beginning developmental stage, in which everything is viewed as either right or wrong. Commitment is the highest level of development, in which development in reasoning ability has led a person to commit him- or herself to accepting that rather than being inherently right or wrong, almost everything is completely context-dependent. Participants included 242 students, aged 17 to 24 years, enrolled in church-affiliated universities.

      Copeland (1995) found that the most significantly related demographic variable was level of education ($p < .001$), with upperclassmen showing lower levels of fundamentalism than freshmen. Respondents who had high scores on the CFS (indicating greater levels of fundamentalism) scored significantly higher on the Dualism subscale of the SID and significantly lower on the Commitment subscale than those who had mid or low level scores on the CFS. This finding suggests that people who hold a great deal of fundamentalist beliefs have a less developed intellect, as indicated by presence of dualistic thinking, than those who hold few or no fundamentalist beliefs.

Recent Intelligence & Religiosity Research

Recently, many large-scale studies have been conducted with the goal of examining the intelligence-religiosity relationship. Three of these studies used data from the 1997 National Longitudinal Survey on Youth (NLSY97), which examines a multitude of characteristics in adolescents ranging from 12 to 17 years of age. In the most recent study, Ganzach and Gotlibovski (2013) examined intelligence as a function of changes in religiosity and intelligence over time and as a function of family characteristics. Education and religiosity were examined in almost 9,000 participants from this sample at three time points: 2002, 2005, and 2008. Intelligence and background characteristics were measured only once, when participants were an average age of 15 years (in 1997), while religiosity and education were measured over the three time points until participants were an average age of 28 years. Intelligence was assessed using the Armed Forces Qualification Test (AFQT), the closest proxy to an intelligence measure included in the NLSY97 data. Results indicated that the inverse intelligence-religiosity relationship became more negative over time ($r = -0.23$, $r = -0.28$, $r = -0.30$). Analyses within siblings revealed a negative association between intelligence and religiosity ($r = -.343$), which became more negative over time, indicating to the authors a strong effect of overall family intelligence and background characteristics on religiosity. Neither education alone nor the interaction of education and intelligence predicted religiosity of siblings.

Another recent study using the same sample (NLSY97) found inverse relationships between intelligence and religiosity as well as education and religiosity (Ganzach, Ellis, & Gotlibovski, 2013). However, due to the positive correlation between education and intelligence, education was not as strongly correlated with religiosity when controlling for intelligence. Ganzach and colleagues also conducted a second study examining an adult population (average age of 43 years) using data from the General Social Survey. Consistent with previous research, intelligence and education were positively correlated, while the intelligence-religiosity relationship was negative. Contrary to findings with the previously described study that used an adolescent sample, education had no mediating effect between religiosity and intelligence.

These results should not be taken at face value, however. A closer examination of the measurements used reveals a number of methodological issues. For example, the AFQT, which was used as a measure of intelligence, appears to be a measure of literacy rather than cognitive ability (Marks, 2010). In addition, in the aforementioned studies using NLSY97 data, religiosity is assessed by five dichotomous items assessing attitudes toward religious writings and prayers (Ganzach et al., 2013; Ganzach & Gotlibovski, 2013). For the purpose of these analyses, items were summed and multiplied by 100 to create a religiosity scale. Expanding the data from summed dichotomous responses to a 500-point scale is questionable alone, not to mention that only five items were used to assess a construct as complex as religiosity. Within the same data set, the assessment of education also lacks detail, in that actual level of educational achievement is not assessed, only years of full-time attendance. This issue may be partially responsible for the previously mentioned results indicating that education had no mediating effect on the negative intelligence-religiosity relationship (Ganzach et al., 2013).

Another study (Nyborg, 2009) used the NLSY97 data to explain how intelligence, religiosity, church denomination, and income level are factors of one another in terms of a proposed construct called the "g nexus." The g nexus was described as a web of phenotypic (e.g., cognition, behavior, emotion) indicators all linked to a central g factor – neural brain efficiency (Nyborg, 2009). This study also attempted to explain the wide-spread prevalence of religiosity across all different countries and groups. Selection of church denomination was presumed to be a product of an individual's cognitive complexity; this was based on the idea that more intelligent (or, in Nyborg's words, "more evolved") people tend to use their religion for personal benefit, while dogmatism is more attractive to those with lesser optimally evolved neurology, or low g. Dogma was presumed to be more attractive to the "lesser evolved" because it requires only accepting established explanations for meaning for the threats and ambiguities of life. Additionally, geography was presumed to be a factor of evolved intelligence, in that those subjected to more difficult environmental hazards are presumed to have higher g factor because of the necessity for increased rational thinking, while individuals with an easygoing environment evolve with lower g. Results indicated a difference of 5.13 IQ points between white religious people and atheists; agnostics had 1.95 fewer IQ points than atheists, and liberals had 3.82 fewer IQ points than agnostics.

Reeve expounded upon the g nexus hypothesis by comparing 192 countries in terms of national IQ, wealth, belief rate, health, and fertility rates (2009). National IQ was based on prior estimates from Lynn and Harvey (2008). Results indicated that, even when controlling for wealth, national IQ had a positive effect on health in terms of fertility rates, infant mortality, maternal mortality, and life expectancy. Moreover, intelligence appeared to be a buffer against the observed negative effects of belief rate (defined as the percentage of the population who hold religious beliefs) on overall health and reproductive health. In countries with higher IQ, the negative effects of belief rate were null; a strong negative influence of belief rate was found in countries with low IQ. One particularly

interesting finding in this study is the very strong correlation between national IQ levels and education ($r = .83$). Although wealth was statistically removed as a potential influence on measures of health, education could account for a large amount of the variance in the outcome measures. National IQ and rate of people believing in a god is a questionable method of assessing the intelligence-religiosity relationship. The lack of consistent, standardized individual assessment of both IQ and religion in these studies is a major impediment to taking the results seriously. However, using these two "measures" seems to be a growing trend in this area of the literature.

The World Value Survey (involving 96 countries) along with the Gallup World Poll (including data from 142 countries) were used to examine the relationship between intelligence, religiosity, and education cross-nationally (Meisenberg, Rindermann, Patel, & Woodley, 2012). National IQ was estimated from the work of Lynn and Vanhanen (2006). For countries not available from Lynn and Vanhanen (2006), IQ was estimated according to neighboring countries with similar characteristics. A total of 328,327 respondents and 194 countries were used for several various analyses. Religiosity was assessed with questions regarding religious affiliation, attendance of religious services, and four items about religious belief. Education was measured via four different databases assessing exposure to formal education. Some within-country analyses revealed that education accounted for 65% of the variance in religiosity (positive correlations in 25 countries and negative correlations in 70 countries); however, in countries with an IQ above 85 (below this IQ point, the relationship is virtually negligible), the relationship between education and religiosity became much more negative. Around 110 IQ points and above, the education-religiosity relationship again became negligible. Conversely, between-country analyses indicated that education and intelligence have an inverse relationship with religiosity. The lack of a direct, linear relationship between intelligence and religiosity suggests that other variables are involved or that the measures being used are assessing an unknown construct.

Interestingly, a positive relationship between intelligence and religiosity was found in countries within Sub-Saharan Africa (Reeve, 2009). In his critique of this study, Dutton (2013) suggested that this positive relationship could be explained by the lack of differentiation between religiosity and superstitious beliefs, suggesting that religiosity (and not superstition) would be inversely related to intelligence, similar to results found with other countries. Similarly, Meisenberg et al. (2012) found a positive relationship between educational attainment and religiosity in Sweden and Britain. Authors explained this anomaly by arguing that highly intelligent people (or those with more education, in this case) are motivated by the extrinsic benefits of religion instead of intrinsic commitment. Dutton argued that this phenomenon is better explained by liberal religiosity which, according to him, was more similar to atheism than religion (2013). Meisenberg and colleagues (2012) also offered the idea that economically stable nations contained a higher percentage of people working high-ranking jobs, leading to increased stress and thus a greater reliance on religion. Dutton (2013) argued that this is not the case because lower status jobs have been shown to be more stressful. The primary criticism Dutton offered was that an incomplete measure of education was used as a proxy for intelligence.

The primary issue with large-scale studies appears to be the measurements used to assess intelligence, religiosity, and education – the main variables of interest. Large, cross-national studies examining the intelligence-religiosity relationship are beneficial in terms of generalizability. However, many such studies are riddled with methodological errors; thus making them complex, confusing, and not much of an addition to the literature on the topic. Small-scale studies tend to have more direct, standardized measures, increasing validity but reducing generalizability.

The most recent small-scale studies involving intelligence and religiosity have not assessed the relationship directly. Motivation, moral development, and religious judgment were assessed in a group of 20 mathematically gifted adolescents (Nokelainen & Tirri, 2010). Intelligence scores, measured with the WAIS-III, were considered above average (111 to 139) and positively correlated with math entrance exam scores. A measure assessing Kolberg's stages of moral development was interpreted as a measure of religiosity. Results indicated that highly intellectual individuals are less religious than the general population (Nokelainen & Tirri, 2010). In actuality, the majority of these adolescents with above average intelligence in this sample fell within Kolberg's third state of moral development (i.e., deism – "the free human acts autonomously without God") rather than saying they were non-theistic. The results drawn in terms of intelligence and religiosity appear to be rather presumptuous, due to the inadequate assessment of religiosity.

Bertsch and Pesta used the Wonderlic Personnel Test to examine intelligence in a college population (2009). Three measures assessed religiosity: sectarianism (singularity of their religion; fundamentalism subscale), religious questioning (rigidity of beliefs), and scriptural acceptance (truth of teachings). Sectarianism was found to be inversely related with Wonderlic scores; hence, those who were more likely to believe that their religion was the singular truth (more fundamentalist), had lower intelligence scores. Measures in this study were stronger than many other recent examinations of the intelligence-religiosity relationship, although the population used does not provide

a great deal of generalizability. The absence of an educational measure is the primary issue in this study. As evidenced by aforementioned studies, most literature in this area has revealed an effect of education on the intelligence-religiosity relationship.

In terms of recent research, adolescents and college populations seem to the most prevalently examined populations. A meta-analysis examining the intelligence-religiosity relationship and associated explanations and mediators observed the findings of 63 studies, grouping them into pre-college, college, and non-college populations (Zuckerman, Silberman, & Hall, 2013). Weighted correlations and effect sizes (Cohen's *d*) by sample type were as follows: pre-college ($r = -.07$), college ($r = -.15$), and non-college ($r = -.15$). Ten of the 63 studies showed a positive relationship between religiosity and intelligence but only two were statistically significant, while 35 showed a statistically significant negative correlation between the two. An analysis including correlations from all 63 studies indicated a small negative relationship between intelligence and religiosity ($r = -.13$). Studies were also grouped according to whether measures of religiosity were obtained in terms of religious beliefs or religious behaviors. A stronger negative correlation between intelligence and religiosity was found in studies assessing religious belief versus religious behavior. Both religiosity measures revealed an increasingly negative relationship from pre-college, college, to non-college. That is, the strongest negative correlation was in the non-college (e.g., adult) population.

Zuckerman et al. suggested three explanations for the frequent negative intelligence-religiosity relationship (2013). First, it was argued that atheism was a form of nonconformity, suggesting that more intelligent people were less likely to conform to the religious orthodoxy of their surrounding social environment. This argument does not hold up, however, when considering societies in which religion is not the pervasive social norm. Second, atheism is also presumed to be related with a more analytical (versus intuitive) cognitive style – one that is not prone to religious beliefs. According to Razmyar and Reeve (2013), however, there is not a significant relationship between cognitive style and cognitive ability. Finally, compensatory control, self-regulation, self-enhancement, and attachment are all supported as needs often met by religion; it is argued that more intelligent individuals have ways of filling these needs without the help of religion. This argument again is quite bold in light of the actual results present in the meta-analysis. Considering the significant methodological flaws with many of the studies reviewed, the conclusions drawn appear somewhat bold.

Two recent studies have garnered a large amount of attention in particular. Lynn, Harvey, and Nyborg (2009) reported on a significant negative correlation between national IQ and level of religiosity among nations evaluated. This study used IQ scores from Lynn and Vanhanen's (2006) book, *IQ and Global Inequality*, which estimated average IQs of various nations ranging from around 110 in eastern Asian countries to IQs below 70 in sub-Saharan Africa. For reference, IQ scores have a mean of 100 and a standard deviation of 15. Under most diagnostic systems, IQ scores of 70 or below qualify someone as being intellectually disabled (ID; Maulik & Harbour, 2010). Immediately, one notes that there are some obvious problems with these ranges, as the vast majority of people living in sub-Saharan Africa could not actually be intellectually disabled, since reasonable population estimates for ID are between 1 and 2% (World Health Organization, 2001). Mackintosh (2006) also raised concerns about the numbers used in the national IQs, including the misreporting of scores from original studies to *IQ and Global Inequality*. These types of numbers (compiled from studies across the last 40 years and using a host of different measures) are also the result of using non-culturally neutral (or even culture-specific) IQ tests. Further, religiosity was simply "measured" in this study as being the percentage of the population that reported not believing in a god. These results are highly suspect, then, when applied at any sort of individual level given that the study directly measured neither intelligence nor religiosity.

Kanazawa (2010) analyzed data from the National Longitudinal Study of Adolescent Health, a US sample that were (among many other things) tested with the Peabody Picture Vocabulary Test (PPVT) and asked, "To what extent are you a religious person?" The responses were coded "not religious at all," "slightly religious," "moderately religious," and "very religious." The results showed that the "not religious at all" group had the highest IQ (103.09), followed in descending order by what, what, and what (IQs = 99.34, 98.28, 97.14, respectively). An important issue with this study is that the PPVT only measures verbal aspects of intelligence, which is strongly correlated with overall intelligence [$r = .80$] but fails to account for other aspects of IQ, and has been found to underestimate IQ in those of above average intelligence (Bell et al., 2001). Another problem was that initial PPVT scores were used to predict at religious beliefs seven years later, despite the fact that Kanazawa himself acknowledges only a moderate correlation between initial and later PPVT scores. Further, using a single question rather than a standardized measure to examine religious beliefs is problematic in that it does not allow for separation of fundamentalist from non-fundamentalist beliefs. Finally, the noted difference of six points in "IQ" scores represents less than half of a standard deviation, and is therefore unlikely to represent any clinically significant differences.

In the same study, Kanazawa (2010) used General Social Survey (GSS) results to examine the same issue. Similar methodological problems are seen, in that religiosity was measured through the use of a single question and

"intelligence" was measured by asking respondents to select a synonym for a word out of five candidates (a total of 10 times). Although this certainly measured an aspect of verbal skills, which are correlated positively with intelligence, it ignored the general conceptualization of intelligence as being multifaceted and not solely verbal. As in part one, the actual differences are also quite small (when examining the regression coefficients) and, although statistically significant due to a huge sample size, are unlikely to be reflective of meaningful real-world differences.

In an attempt to address the problems with the above two studies and a number of others examining religiosity and intelligence, Lewis, Ritchie, and Bates (2011) conducted a study using a large sample of US adults (over 2,200 subjects). It measured six domains of religiosity, the personality factor of openness, and "general intelligence" based on results of five sub-tests (word list recall, working memory span, verbal fluency, inductive reasoning, and speed of processing). It should be noted that these were not part of a test of a standardized test of intelligence, and as such suffer from that, but are likely better indicators than the measures used in Kanazawa (2010) or Lynn et al. (2009) given that these cover a broader array of skills typically measured in standardized IQ tests. Results found that intelligence was negatively associated with five of the six measures of religiosity, most strongly with fundamentalism. Effect sizes were statistically significant but only added a small amount of predictive validity on top of education and openness (accounting for only 5% of the variance in religiosity). In addition, openness positively predicted the spiritual elements of religion but was negatively associated with fundamentalism.

Conclusions & Future Directions

Conclusions confidently drawn from research on the relationship of religiosity and intelligence are limited, primarily because methodology in studies of the potential relationship between intelligence and religiosity is incredibly variable. For instance, there has been very little consistency in the measures used to assess religious variables across studies. Some used church membership or self-professed belief in a deity while others used questionnaires created and used only by the study's authors. Information regarding fundamentalism's relationship with the construct of intelligence itself is virtually non-existent. Few researchers have attempted to measure or control for level of fundamentalist beliefs and instead appear to consider religiosity to be a dichotomous variable, ignoring the diversity of belief among the religious. There is also little consistency across studies in how intelligence is typically assessed or even defined. Some studies use tests designed specifically to measure intelligence, some use measures designed to measure only a single aspect of intelligence (e.g., verbal skills), and others use measures that are more achievement-based (e.g., university entrance exams or GPA). Partially because of these inconsistencies, findings in studies correlating religious beliefs and intelligence are mixed. The extreme range of these studies' measures, variables of interest, subjects, and publication dates makes synthesis of the literature difficult.

Although this area of research lacks conclusive findings, existing studies do generate new directions for research and hypotheses about the relationships among the variables of intelligence, religiosity, and fundamentalism. For example, fundamentalist religious beliefs appear to hamper an American's ability to take full advantage of education opportunities, particularly at the collegiate level (Altemeyer & Hunsberger, 1992; Burton, Johnson, & Tamney, 1989; Darnell & Sherkat, 1997). This could be by choice (e.g., a person's chosen religious institution discourages higher learning) or because of a lack of skills necessary to succeed in higher education (e.g., a person is homeschooled using a curriculum that neglected development of math or science skills that become highly important in college entrance exams). Another mediating factor contributing to low levels of educational attainment among those with fundamentalist religious beliefs might be a negative attitude toward scientific findings that many view as contradictory to the teaching of the Christian Bible.

Our assertion, based on the above-reviewed studies, is that any noted intelligence differences seen between people of varying religious beliefs is most likely the result of educational differences that are in turn the result of holding fundamentalist religious beliefs, rather than the result of an innate difference in intelligence. Therefore, controlling for levels of fundamentalist beliefs are likely to make any differences between theists and non-theists disappear. In other words, if groups of theists and non-theists of the same educational and socioeconomic levels were compared on standard, individually administered intelligence tests, we hypothesize that there would likely be no significant group differences. But, while type and quality of education is likely to play a role in any potentially observed IQ differences, there are other variables in the reviewed studies (the personality factor of openness, for example) that should also be assessed in future research. Researchers should not limit their studies to examining only a narrow definition of religiosity, nor should new studies use measures that are of questionable value in assessing intelligence. Instead, a variety of demographic, religious, cognitive, and personality variables needs to be assessed to find out which (alone or in combination) are more related to any observed differences in intelligence. Importantly, researchers should administer individual measures of intelligence that are modern, valid, and well-

constructed. Well-designed studies in this area are necessary to clarify how (or even if) religiosity and intelligence are related.

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